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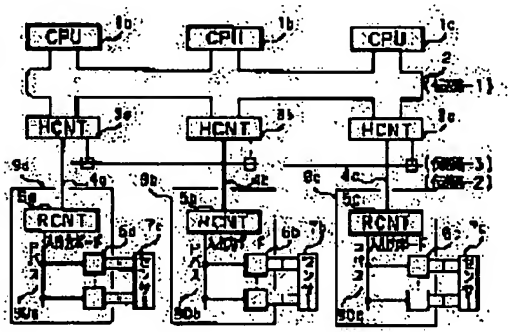
(54) DISTRIBUTED PROCESS INPUTTING AND OUTPUTTING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain the simultaneity of data by providing a synchronizing signal generating circuit at a host controller, transmitting a synchronizing signal to a remote controller in response to a command from a CPU, and operating synchronous scan based on this synchronizing signal.

SOLUTION: Plural host controllers 3a (3b, 3c) are provided with synchronizing signal generating circuits, and synchronizing signals generated by those synchronizing signal generating circuits are supplied to each remote controller. Also, the host controller being the master of the generation of the synchronizing signals is designated from among the host controllers, and a slave being the master instead when the host controller being the master breaks down is designated in response to designations from CPU 1a (1b, 1c). Then, the synchronous scan of outside connected sensors is operated based on the synchronizing signals transmitted from the host controllers by remote controllers 5a (5b, 5c), and the data are fetched by the CPU from which the request is issued.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] Especially this invention is used for the computing system which manages the monitor of a plant etc., and control, and relates to a suitable distributed process input unit.
[0002]
[Description of the Prior Art] The monitor of a plant etc. and the configuration of the distributed process input output equipment used for the computing system which performs control are shown in drawing 4 .
[0003] Distributed process input output equipment is connected through one or more CPUs 41, 41, and 43 and the bus 44 used as the control center of the computer system which performs plant monitor and control. It is distributed to the host controllers 45, 46, and 47 and each host controllers 45, 46, and 47 which control this equipment based on the information interchange between these CPUs 41, 42, and 43, and the command from CPUs 41, 42, and 43. Optical transmission lines 51, 52, and 53 are minded, respectively. Among each host controllers 45, 46, and 47 Informational delivery, And it consists of the remote controllers 48, 49, and 50 which control I / O boards 57, 58, and 59 which manage an interface with the sensors 54, 55, and 56 by which external connection is made, and information on sensors 54, 55, and 56 is delivered based on the command from CPUs 41, 42, and 43.
[0004]
[Problem(s) to be Solved by the Invention] Since the conventional distributed process input output equipment mentioned above was the configuration that informational delivery was made by each distributed sensor 54 and 55, every 56, and asynchronous among CPUs 41, 42, and 43, the synchronous scan of I / O boards 57, 58, and 59 which could not acquire the synchronia of the data as an entire plant, and were connected to remote controllers 48, 49, and 50 between two or more remote controllers 48 and 49 and 50 of it was not completed. Therefore, detailed data, such as time series change of each sensor or correlation between each sensor, could not be obtained, and monitor fine as an entire plant and control were not completed.
[0005] It aims at offering the distributed process input output equipment which acquires the synchronia of data by making this invention in view of the above-mentioned situation, establishing a synchronizing signal generating circuit in each host controller, transmitting that synchronizing signal to a remote controller by the command from CPU, and performing a synchronous scan based on this synchronizing signal. Moreover, also let it be the purpose to offer the distributed process input output equipment which also aimed at improvement in dependability by supplying the synchronizing signal to a remote controller instead of being the host controller by which the host controller by which the host controller used as a master serves as a slave at the time of failure serves as a master.
[0006]
[Means for Solving the Problem] For the distributed blocking output unit of this invention, at least one CPU and CPU are the 1st. Two or more host controllers connected through a transmission line, Information interchange between the host controllers which prepare and correspond corresponding to each of this host controller, And the remote controller which controls the I / O board which manages an interface with the sensor by which external connection is made is the 2nd. It connects through an optical transmission line. In the computing system which delivers information on a sensor based on the command from Above CPU, the host controller which serves as a master among two or more above-mentioned host controllers In order to carry out the synchronous input of the data from a sensor, the synchronizing signal generating circuit to build in generates a synchronizing signal in person. It photosynthesizes with data and the 2nd optical transmission line is minded. To each remote controller usually, delivery and each remote controller Optical distribution are carried out from the signal, and synchronous scan timing is generated in the synchronous scan generating circuit which extracts and builds in a synchronizing signal, and it is characterized by carrying out the

synchronous input of the data of the sensor by which external connection is made through the 2nd optical transmission line. Moreover, the host controller used as a slave supervises the synchronizing signal from the host controller which serves as a master through the 3rd transmission line which connects between host controllers, generates a synchronizing signal by the synchronizing signal generating circuit built in instead of the host controller by which the host controller used as a slave serves as a master at the time of malfunction detection, and is characterized also by supplying the synchronizing signal to each remote controller.

[0007] By this, a synchronous scan can be performed as the whole plant system which consists of a CPU and a host controller, therefore time series change of a sensor, the correlation for every time amount between each sensor, etc. can be known, and it becomes a fine monitor and controllable using this.

[0008]

[Embodiment of the Invention] Drawing 1 is the block diagram showing the operation gestalt of the distributed process input output equipment of this invention. In drawing, 1a, 1b, and 1c are CPUs which manage the monitor of a plant etc., and control. 2 is CPUs 1a, 1b, and 1c, the host controllers 3a and 3b mentioned later, and a bus used as the data transmission line between 3c. The host controllers 3a, 3b, and 3c serve as a control center of the whole distributed blocking output unit of this invention based on delivery of the information on CPUs 1a, 1b, and 1c, and directions of CPUs 1a, 1b, and 1c.

[0009] 4a, 4b, and 4c are the optical transmission lines for the data communication between each host controllers 3a, 3b, and 3c, the remote controllers 5a and 5b mentioned later, and 5c. Remote controllers 5a, 5b, and 5c are distributed, and control delivery of the information on each host controllers 3a, 3b, and 3c, and I / O boards 6a, 6b, and 6c. I / O boards 6a, 6b, and 6c perform data I/O with each sensor 7a, 7b, and 7c connected to the internal buses 90a, 90b, and 90c which remote controllers 5a, 5b, and 5c have. Sensors 7a, 7b, and 7c consist of the various sensors in which monitor of the plant used as the controlled system of CPUs 1a, 1b, and 1c supervised [and] and control are performed. It is distributed process input output equipment with which 8 consists of each host controllers 3a and 3b and a transmission line for synchronizing signals between 3c, and 9a, 9b, and 9c consist of remote side apparatus of the above-mentioned equipment.

[0010] The internal configuration of host controller 3a (3b, 3c) is shown in drawing 2 . The block thru/or channel to which the same number as drawing 1 was given presupposes among drawing that it is the same as it of drawing 1 . In drawing, the controller (communication link I/O) and 312a which control the communication interface circuit for connecting 311 to a transmission line 2 and this are a communication-interface circuit used for the synchronizing signal used in order that the communication-interface circuit for data communication between host controller 3a (3b, 3c) and remote controller 5a (5b, 5c) and 312b may take a synchronization between each host controller 3a (3b, 3c). The microcomputer (MPU) with which 313 becomes the control center of host controller 3a (3b, 3c) and 314 [moreover,] ROM in which the firmware of MPU313 is stored, and 315 RAM used as memory of a working-level month when MPU313 reads and performs the firmware, and 316 are shared memories (SM) used for CPUs 1, 2, and 3 and the data delivery with remote controller 5a (5b, 5c).

[0011] 317 is a synchronizing signal generating circuit which generates the synchronizing signal for carrying out each host controller 3a (b [3], 3c) ******. The E/O converter and 318b which 318a is connected to the communication-interface circuit 312, and change into a lightwave signal (O) the electrical signal (E) which is transmit data The E/O converter which changes into a lightwave signal the synchronizing signal (electrical signal) outputted from the synchronizing signal generating circuit 317, and 319 The O/E converter which connects with the communication-interface circuit 312 and is changed into an electrical signal from a lightwave signal, and 320 It is the photosynthesis machine which photosynthesizes the lightwave signal which changed the transmit data of the communication-interface circuit 312 by E/O transducer 18a, and the lightwave signal which changed the synchronizing signal which is the output data of the synchronizing signal generating circuit 317 by E/O transducer 318b.

[0012] The internal configuration of remote controller 5a (5b, 5c) is shown in drawing 3 . The block thru/or channel to which the same number as drawing 1 was given presupposes among drawing that it is the same as it of drawing 1 . In drawing 531 the communication link SUNTA face circuit for data communication between host controller 3a (3b, 3c) and remote controller 5a (5b, 5c) and 532 The bus interface circuitry which manages an interface with internal bus 90a (90b, 90c), The microcomputer (MPU) with which 533 becomes the control center of remote controller 5a (5b, 5c), and 534 ROM in which the firmware of MPU533 is stored, and 535 RAM used as memory of a working-level month when MPU533 reads and performs the firmware, and 536 are shared memories (SM) used for CPUs 1, 2, and 3 and the data delivery with remote controller 5a (5b, 5c).

[0013] EEPROM to which 537 holds the control information (a mode of operation, a transfer period, I/O range, etc.) of remote controller 5a (5b, 5c), and 538 The distributor which distributes the lightwave signal sent through host

controller 3a (3b, 3c) to optical transmission line 4a (4b, 4c) to the lightwave signal of the synchronizing signal which are transmit data and an output signal, The E/O converter which changes into a lightwave signal (O) the electrical signal (E) which is the transmit data which 518 is connected to the communication-interface circuit 531, and is sent to host controller 3a (3b, 3c) from remote controller 5a (5b, 5c), The E/O converter and 519b which change into an electrical signal the lightwave signal of the transmit data with which 519a is sent from a distributor 538 The E/O converter which changes into an electrical signal the synchronizing signal which is an output signal, and 539 are synchronous scan generating circuits which perform a synchronous scan using the synchronizing signal which is an output signal sent from E/O converter 519b.

[0014] Hereafter, actuation of this invention operation gestalt is explained using drawing 1 thru/or drawing 3 . First, when incorporating data to host controller 3a (3b, 3c) from sensor 7a (7b, 7c) which is a controlled system supervised [and], CPU1a specifies as the beginning the input range set as the object of a mode of operation and Di **-TA incorporation the exception of a master and a slave to host controller 3a (3b, 3c), and starts these host controller 3a (3b, 3c).

[0015] Host controller 3a (3b, 3c) analyzes the specified contents by MPU313, and determines the mode of operation of host controller 3a (3b, 3c). Host controller 3a specified as a master transmits a synchronizing signal to each host controllers 3b and 3c via communication-interface circuit 312b and a transmission line 8. As opposed to remote controller 5a (5b, 5c) which corresponds, respectively Moreover, communication-interface circuit 312a, While transmitting the control information (a mode of operation, a transfer period, input range, etc.) of remote controller 5a (5b, 5c) via E/O converter 318a, the photosynthesis machine 320, and optical transmission line 4a (4b, 4c) The synchronizing signal to remote controller 5a (5b, 5c) is generated in the synchronizing signal generating circuit 317 to build in, and the synchronizing signal is transmitted via E/O converter 318b, the photosynthesis machine 320, and optical transmission line 4a (4b, 4c).

[0016] Then, remote conte RORA 5a (5bb, 5c) generates synchronous scan timing in the synchronous scan generating circuit 539 from the synchronizing signal which is an output signal sent from host controller 3a (3b, 3c) while it is analyzed by MPU533 which builds in the control information mentioned above and determines a mode of operation. According to the synchronous scan timing and the mode of operation which are generated here, I / O board 6a (6b, 6c) is controlled, the data of sensor 7a (7b, 7c) of the appointed range are incorporated for every assignment period, and the data is transmitted to host controller 3a (3b, 3c) for every assignment period after processing.

[0017] Host controller 3a (3b, 3c) receives the data sent from remote controller 5a (5b, 5c), and transmits to CPU1a (1b, 1c) for every assignment period after processing data according to a mode of operation. CPU1a (1b, 1c) writes in the memory area which had data sent from host controller 3a (3b, 3c) specified for every assignment period. By using this data, time series change of sensor 7a (7b, 7c) made into the purpose and the correlation for every time amount between each sensor can be known.

[0018] In addition, host controller 3b (3c) specified as a slave here supervises the synchronizing signal from host controller 3a used as a master through a transmission line 8, if it does not reach in fixed time amount, it judges it as failure, it generates a synchronizing signal in the synchronizing signal generating circuit 317 built in instead of master host controller 3a, and transmits the synchronizing signal through a transmission line 8.

[0019]

[Effect of the Invention] By this invention's establishing a synchronizing signal generating circuit in each host controller, transmitting that synchronizing signal to a remote controller by the command from CPU like explanation, above, and performing a synchronous scan based on this synchronizing signal The host controller which can acquire the synchronia of data and serves as a master At the time of failure Instead of being the host controller by which the host controller used as a slave serves as a master, by supplying the synchronizing signal to a remote controller, ****** of dependability can be measured and the descendant effectiveness of enumerating below further is also acquired.

[0020] (1) It is not necessary to newly prepare the optical fiber for synchronizing signals between a host controller and a remote controller.

[0021] (2) Replacement system style after construction becomes easy as a control system of a plant.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram showing the gestalt of operation of this invention,
[Drawing 2] The block diagram showing the internal configuration of the host controller shown in drawing 1 ,
[Drawing 3] The block diagram showing the internal configuration of a remote controller shown in drawing 1 ,
[Drawing 4] The block diagram showing the configuration of conventional distributed process input output equipment,
[Description of Notations]
1a (1b, 1c) -- CPU, 2 -- A transmission line, 3a (3b, 3c) -- Host controller, 4a (4b, 4c) -- An optical transmission line, 5a (5b, 5c) -- Remote controller, 6a (6b, 6c) -- A I / O board, 7a (7b, 7c) -- Sensor, 8 [-- An E/O converter, 319 (519a, 519b) / -- An O/E converter, 538 / -- An optical distributor, 539 / -- Synchronous scan generating circuit] -- A synchronizing signal transmission line, 9a (9b, 9c) -- Distributed process input output equipment, 317 -- A synchronizing signal generating circuit, 318a (318b, 518)

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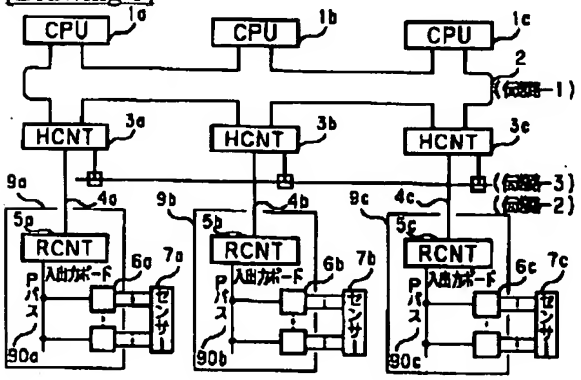
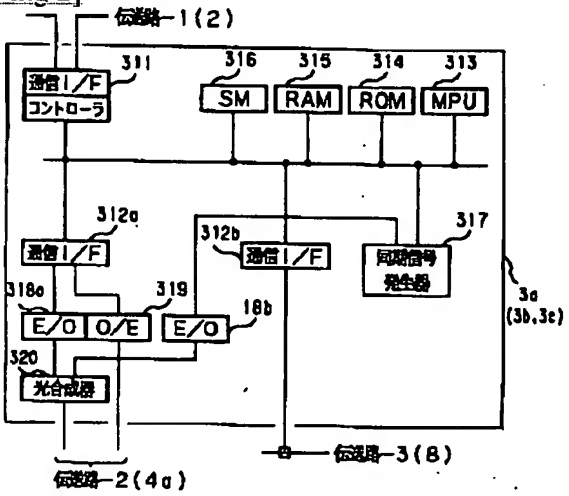
DRAWINGS

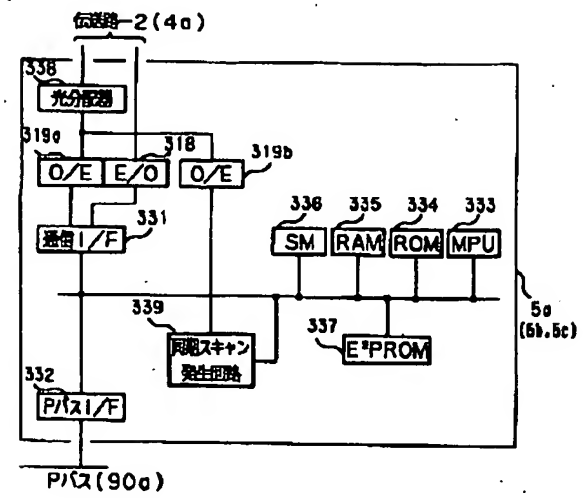
[Drawing 1]



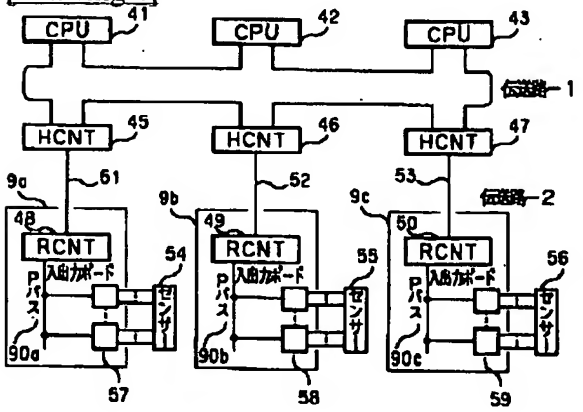
[Drawing 2]



[Drawing 3]



[Drawing 4]



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